

accredited 602 radiography programs in 1999. The Joint Review Committee on Education in Diagnostic Medical Sonography accredited 77 programs in sonography in 1998.

Radiography programs require, at a minimum, a high school diploma or the equivalent. High school courses in mathematics, physics, chemistry, and biology are helpful. The programs provide both classroom and clinical instruction in anatomy and physiology, patient care procedures, radiation physics, radiation protection, principles of imaging, medical terminology, positioning of patients, medical ethics, radiobiology, and pathology.

For training programs in diagnostic medical sonography, applicants with a background in science, or experience in one of the health professions, generally are preferred. Some programs consider applicants with liberal arts backgrounds, however, as well as high school graduates with courses in math and science.

In 1981, Congress passed the Consumer-Patient Radiation Health and Safety Act, which aims to protect the public from the hazards of unnecessary exposure to medical and dental radiation by ensuring operators of radiologic equipment are properly trained. Under the act, the Federal Government sets voluntary standards that the States, in turn, may use for accrediting training programs and certifying individuals who engage in medical or dental radiography. Because ultrasound does not use ionizing radiation, sonographers are excluded from this act.

In 1999, 35 States and Puerto Rico licensed radiologic technologists. No State requires sonographers to be licensed. Voluntary registration is offered by the American Registry of Radiologic Technologists (ARRT) in radiography. The American Registry of Diagnostic Medical Sonographers (ARDMS) certifies the competence of sonographers. To be eligible for registration, technologists generally must graduate from an accredited program and pass an examination. Many employers prefer to hire registered radiographers and sonographers.

With experience and additional training, staff technologists may become specialists, performing CT scanning, angiography, and magnetic resonance imaging. Experienced technologists may also be promoted to supervisor, chief radiologic technologist, and—ultimately—department administrator or director. Depending on the institution, courses or a master’s degree in business or health administration may be necessary for the director’s position. Some technologists progress by becoming instructors or directors in radiologic technology programs; others take jobs as sales representatives or instructors with equipment manufacturers.

Radiographers must complete 24 hours of continuing education every other year and provide documentation to prove they have complied with these requirements. Sonographers must complete 30 hours of continuing education every 3 years.

Job Outlook

Employment of radiologic technologists is expected to grow as fast as the average for all occupations through 2008, as the population grows and ages, increasing the demand for diagnostic imaging and therapeutic technology. Although physicians are enthusiastic about the clinical benefits of new technologies, the extent to which they are adopted depends largely on cost and reimbursement considerations. Some promising new technologies may not come into widespread use because they are too expensive and third-party payers may not be willing to pay for their use.

Sonographers should experience somewhat better job opportunities than radiographers. Ultrasound is becoming an increasingly attractive alternative to radiologic procedures. Ultrasound technology is expected to continue to evolve rapidly and spawn many new ultrasound procedures. Furthermore, because ultrasound does not use radiation for imaging, there are few possible side effects.

Radiologic technologists who are educated and credentialed in more than one type of imaging technology, such as radiography and ultrasonography or nuclear medicine, will have better employment

opportunities as employers look for new ways to control costs. In hospitals, multi-skilled employees will be the most sought after, as hospitals respond to cost pressures by continuing to merge departments.

Hospitals will remain the principal employer of radiologic technologists. However, employment is expected to grow most rapidly in offices and clinics of physicians, including diagnostic imaging centers. Health facilities such as these are expected to grow very rapidly through 2008 due to the strong shift toward outpatient care, encouraged by third-party payers and made possible by technological advances that permit more procedures to be performed outside the hospital. Some job openings will also arise from the need to replace technologists who leave the occupation.

Earnings

Median annual earnings of radiologic technologists and technicians were \$32,880 in 1998. The middle 50 percent earned between \$27,560 and \$39,420 a year. The lowest 10 percent earned less than \$23,650 and the highest 10 percent earned more than \$47,610 a year. Median annual earnings in the industries employing the largest number of radiologic technologists and technicians in 1997 were:

Medical and dental laboratories .....	\$34,400
Hospitals .....	31,600
Offices and clinics of medical doctors .....	30,800

Related Occupations

Radiologic technologists operate sophisticated equipment to help physicians, dentists, and other health practitioners diagnose and treat patients. Workers in related occupations include radiation dosimetrists, nuclear medicine technologists, cardiovascular technologists and technicians, radiation therapists, perfusionists, respiratory therapists, clinical laboratory technologists, and electrophysiology technologists.

Sources of Additional Information

For career information, enclose a stamped, self-addressed business size envelope with your request to:

- ✦ American Society of Radiologic Technologists, 15000 Central Ave. SE., Albuquerque, NM 87123-3917.
- ✦ Society of Diagnostic Medical Sonographers, 12770 Coit Rd., Suite 708, Dallas, TX 75251.
- ✦ American Healthcare Radiology Administrators, 111 Boston Post Rd., Suite 105, P.O. Box 334, Sudbury, MA 01776.

For the current list of accredited education programs in radiography, write to:

- ✦ Joint Review Committee on Education in Radiologic Technology, 20 N. Wacker Dr., Suite 600, Chicago, IL 60606-2901.

For a current list of accredited education programs in diagnostic medical sonography, write to:

- ✦ The Joint Review Committee on Education in Diagnostic Medical Sonography, 7108 S. Alton Way, Building C., Englewood, CO 80112. Internet: <http://www.caahep.org/programs/dms-prog.htm>

Surgical Technologists

(O\*NET 32928)

Significant Points

- Most educational programs for surgical technologists last approximately 1 year and result in a certificate.
- Increased demand for surgical technologists is expected as the number of surgical procedures grows.

### Nature of the Work

Surgical technologists, also called surgical or operating room technicians, assist in operations under the supervision of surgeons, registered nurses, or other surgical personnel. Before an operation, surgical technologists help set up the operating room with surgical instruments and equipment, sterile linens, and sterile solutions. They assemble, adjust, and check nonsterile equipment to ensure it is working properly. Technologists also prepare patients for surgery by washing, shaving, and disinfecting incision sites. They transport patients to the operating room, help position them on the operating table, and cover them with sterile surgical "drapes." Technologists also observe patients' vital signs, check charts, and help the surgical team scrub and put on gloves, gowns, and masks.

During surgery, technologists pass instruments and other sterile supplies to surgeons and surgeon assistants. They may hold retractors, cut sutures, and help count sponges, needles, supplies, and instruments. Surgical technologists help prepare, care for, and dispose of specimens taken for laboratory analysis and may help apply dressings. Some operate sterilizers, lights, or suction machines, and help operate diagnostic equipment. Technologists may also maintain supplies of fluids, such as plasma and blood.

After an operation, surgical technologists may help transfer patients to the recovery room and clean and restock the operating room.

### Working Conditions

Surgical technologists work in clean, well-lighted, cool environments. They must stand for long periods and remain alert during operations. At times they may be exposed to communicable diseases and unpleasant sights, odors, and materials.

Most surgical technologists work a regular 40-hour week, although they may be on call or work nights, weekends and holidays on a rotating basis.

### Employment

Surgical technologists held about 54,000 jobs in 1998. Most are employed by hospitals, mainly in operating and delivery rooms. Others are employed in clinics and surgical centers, and in the offices of physicians and dentists who perform outpatient surgery. A few, known as private scrubs, are employed directly by surgeons who have special surgical teams like those for liver transplants.

### Training, Other Qualifications, and Advancement

Surgical technologists receive their training in formal programs offered by community and junior colleges, vocational schools, uni-

versities, hospitals, and the military. In 1998, the Commission on Accreditation of Allied Health Education Programs (CAAHEP) recognized 165 accredited programs. High school graduation normally is required for admission. Programs last 9 to 24 months and lead to a certificate, diploma, or associate degree. Shorter programs are designed for students who are already licensed practical nurses or military personnel with the appropriate training.

Programs provide classroom education and supervised clinical experience. Students take courses in anatomy, physiology, microbiology, pharmacology, professional ethics, and medical terminology. Other studies cover the care and safety of patients during surgery, aseptic techniques, and surgical procedures. Students also learn to sterilize instruments; prevent and control infection; and handle special drugs, solutions, supplies, and equipment.

Technologists may obtain voluntary professional certification from the Liaison Council on Certification for the Surgical Technologist by graduating from a formal program and passing a national certification examination. They may then use the designation Certified Surgical Technologist, or CST. Continuing education or reexamination is required to maintain certification, which must be renewed every 6 years. Graduation from a CAAHEP-accredited program will be a prerequisite for certification by March 2000. Most employers prefer to hire certified technologists.

Surgical technologists need manual dexterity to handle instruments quickly. They also must be conscientious, orderly, and emotionally stable to handle the demands of the operating room environment. Technologists must respond quickly and know procedures well to have instruments ready for surgeons without having to be told. They are expected to keep abreast of new developments in the field. Recommended high school courses include health, biology, chemistry, and mathematics.

Technologists advance by specializing in a particular area of surgery, such as neurosurgery or open heart surgery. They may also work as circulating technologists. A circulating technologist is the "unsterile" member of the surgical team who prepares patients; helps with anesthesia; gets, opens, and holds packages for the "sterile" persons during the procedure; interviews the patient before surgery; keeps a written account of the surgical procedure; and answers the surgeon's questions about the patient during the surgery. With additional training, some technologists advance to first assistants, who help with retracting, sponging, suturing, cauterizing bleeders, and closing and treating wounds. Some surgical technologists manage central supply departments in hospitals, or take positions with insurance companies, sterile supply services, and operating equipment firms.

### Job Outlook

Employment of surgical technologists is expected to grow much faster than the average for all occupations through the year 2008 as the volume of surgery increases. The number of surgical procedures is expected to rise as the population grows and ages. As the "baby boom" generation enters retirement age, the over 50 population will account for a larger portion of the general population. Older people require more surgical procedures. Technological advances, such as fiber optics and laser technology, will also permit new surgical procedures to be performed.

Hospitals will continue to be the primary employer of surgical technologists, although much faster employment growth is expected in offices and clinics of physicians, including ambulatory surgical centers.

### Earnings

Median annual earnings of surgical technologists were \$25,780 in 1998. The middle 50 percent earned between \$22,040 and \$30,230 a year. The lowest 10 percent earned less than \$18,930 and the highest 10 percent earned more than \$35,020 a year.



*Surgical technologists prepare operating rooms and assist surgical personnel during operations.*

### Related Occupations

Other health occupations requiring approximately 1 year of training after high school include licensed practical nurses, certified respiratory therapists, medical laboratory assistants, medical assistants, dental assistants, optometric assistants, and physical therapy aides.

### Sources of Additional Information

For additional information on a career as a surgical technologist and a list of CAAHEP-accredited programs, contact:

☛ Association of Surgical Technologists, 7108-C South Alton Way, Englewood, CO 80112. Internet: <http://www.ast.org>

For information on certification, contact:

☛ Liaison Council on Certification for the Surgical Technologist, 7790 East Arapahoe Rd., Suite 240, Englewood, CO 80112-1274.

## Communications-Related Occupations

### Announcers

(O\*NET 34017 and 34021)

#### Significant Points

- Competition for announcer jobs will continue to be keen.
- Jobs at small stations usually have low pay, but offer the best opportunities for beginners.
- Related work experience at a campus radio station or as an intern at a commercial station can be helpful in breaking into the occupation.

#### Nature of the Work

Announcers in radio and television perform a variety of tasks on and off the air. They announce station program information such as program schedules and station breaks for commercials or public service information, and they introduce and close programs. Announcers read prepared scripts or ad-lib commentary on the air when presenting news, sports, weather, time, and commercials. If a written script is required, they may do the research and writing. Announcers also interview guests and moderate panels or discussions. Some provide commentary for the audience during sporting events, parades, and other events. Announcers are often well known to radio and television audiences and may make promotional appearances and remote broadcasts for their stations.

Radio announcers are often called *disc jockeys*. Some disc jockeys specialize in one kind of music. They announce music selections and may decide what music to play. While on the air, they comment on the music, weather, and traffic. They may take requests from listeners, interview guests, and manage listener contests.

*Newscasters* or *anchors* work at large stations and specialize in news, sports, or weather. (See the related statement on news analysts, reporters, and correspondents elsewhere in the *Handbook*.) *Show hosts* may specialize in a certain area of interest such as politics, personal finance, sports, or health. They contribute to the preparation of the program content; interview guests; and discuss issues with viewers, listeners, or an in-studio audience.

Announcers at smaller stations may cover all of these areas and tend to have more off-air duties as well. They may operate the control board, monitor the transmitter, sell commercial time to advertisers, keep a log of the station's daily programming, and do production work. Consolidation and automation make it possible for announcers to do some work previously performed by broadcast technicians. (See the statement on broadcast and sound technicians elsewhere in the *Handbook*.) Announcers use the control board to broadcast programming, commercials, and public service announcements according to schedule. Public radio and television announcers are involved with station fundraising efforts.

Announcers frequently participate in community activities. Sports announcers, for example, may serve as masters of ceremonies at sports

club banquets or may greet customers at openings of sporting goods stores.

Although most announcers are employed in radio and television broadcasting, some are employed in the cable television or motion picture production industries. Other announcers may use a public address system to provide information to the audience at sporting and other events. Some disc jockeys announce and play music at clubs, dances, restaurants, and weddings.

#### Working Conditions

Announcers usually work in well-lighted, air-conditioned, sound-proof studios.

The broadcast day is long for radio and TV stations—some are on the air 24 hours a day—so announcers can expect to work unusual hours. Many present early morning shows, when most people are getting ready for work or commuting, while others do late night programs.



*Competition for announcer jobs will be keen in large markets.*